

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Applicant : Zha, et al.

) Group Art Unit Unknown

Appl. No. : Unknown

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) Commissioner for Patents, Washington, D.C
) 20231, on


Filed : Herewith

For : **SCOURING METHOD**

) January 7, 2002

) (Date)

Examiner : Unknown

) 
) Rose M. Thiessen, Reg No 40,202PRELIMINARY AMENDMENTAssistant Commissioner for Patents
Washington, D.C. 20231

Dear Sir:

Prior to the examination of the above-identified application on the merits, please amend the application as follows:

IN THE SPECIFICATION:

Please insert the following paragraph at page 1, after line 4:

--This application is a continuation of Application No. 09/336,059, filed June 18, 1999, which is the national phase under 35 U.S.C. §371 of prior PCT International Application No. PCT/AU97/00855 which has an International filing date of December 18, 1997, which designated the United States of America, and which was published by the International Bureau in English on July 2, 1998.--

Please substitute the following paragraph for the paragraph beginning at page 2, line 21:

--Summary of the Invention--

Please substitute the following paragraph for the paragraph beginning at page 2, line 29:

Appl. No. : **Unknown**
Filed : **Herewith**

--According to one aspect, the present invention provides a method of removing fouling materials from the surface of a plurality of porous membranes arranged in a membrane module, the porous membranes forming an array, the module having a header wherein said membranes are mounted, the header connected to a source of pressurized gas, the method comprising providing, through the header, gas bubbles in a uniform distribution relative to the porous membrane array such that said bubbles move past the surfaces of said membranes to dislodge fouling materials therefrom, said membranes being arranged in close proximity to one another and mounted to prevent excessive movement therebetween. The porous membranes may comprise hollow fibre membranes. Preferably, the fibre membranes are arranged in bundles surrounded by a perforated cage which serves to prevent said excessive movement therebetween.--

Please substitute the following paragraph for the paragraph beginning at page 3, line 8:

--According to a second aspect, the present invention provides a membrane module comprising a plurality of porous membranes, said membranes being arranged in close proximity to one another and mounted to prevent excessive movement therebetween, the membranes forming an array, the module having a header wherein said membranes are mounted, the header connected to a source of pressurized gas so as to permit formation of, gas bubbles such that, in use, said gas moves through said header, and said bubbles move past the surfaces of said membranes to dislodge fouling materials therefrom.--

Please substitute the following paragraph for the paragraph beginning at page 3, line 15:

--The gas bubbles may be provided from within the module by a variety of methods including gas distribution holes or openings in the header, a porous tube located within the module or a tube or tubes positioned to output gas within the module, the tubes may be in the form of a comb of tubes. Another method of providing gas bubbles includes creating gas in-situ by means of spark type ozone generators or the like. Further types of gas provision are detailed below and in the preferred embodiments of the invention.--

Appl. No. : Unknown
Filed : Herewith

Please substitute the following paragraph for the paragraph beginning at page 3, line 23:

--According to one preferred form, the present invention provides a method of removing fouling materials from the surface of a plurality of porous hollow fibre membranes mounted and extending longitudinally in an array to form a membrane module, said membranes being arranged in close proximity to one another and mounted to prevent excessive movement therebetween, the method comprising the steps of providing, from within said array, via the header connected to a source of pressurized gas, uniformly distributed gas bubbles, said distribution being such that said bubbles pass substantially uniformly between each membrane in said array to scour the surface of said membranes and remove accumulated solids from within the membrane module.--

Please substitute the following paragraph for the paragraph beginning at page 4, line 27:

--According to a preferred further aspect, the present invention provides a filtration system including a membrane module according to said second aspect wherein said filter module is positioned vertically in a tank containing feed liquid to be filtered, means to apply a transmembrane pressure to said fibres in said array to cause filtrate to pass through pores in said fibres and means to supply continually or intermittently a supply of pressurized gas to said aeration holes so as to produce gas bubbles which move upwardly and uniformly between said fibres to scour the outer surfaces thereof.--

Please substitute the following paragraph for the paragraph beginning at page 6, line 27:

--Detailed Description of the Preferred Embodiment--

Please insert the following paragraphs at page 6, after line 25:

--Figures 15a-c show a comb of tubes containing holes, the tube sitting within a module and providing pressurized gas bubbles. Figure 15a is a front view of the comb of tubes. Figure

Appl. No. : **Unknown**
Filed : **Herewith**

15b is a top section view of the comb of tubes along Section A-A. Figure 15c is a top isometric view of the comb of tubes.

Figure 16 shows a module incorporating a porous sheet through which pressurized gas is supplied to provide gas bubbles.--

Appl. No. : Unknown
Filed : Herewith

REMARKS

Attached hereto is a marked-up version of the changes made to the specification by the current amendment. The attached page is captioned "VERSION WITH MARKINGS TO SHOW CHANGES MADE."

Dated: 1/7/02

Respectfully submitted,
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Appl. No. : Unknown
Filed : Herewith

VERSION WITH MARKINGS TO SHOW CHANGES MADE

Deleted text is indicated by **[bracketed boldface]**. Added text is indicated by **underlined boldface**.

IN THE SPECIFICATION:

The following paragraph has been inserted at page 1, after line 4:

--This application is a continuation of Application No. 09/336,059, filed June 18, 1999, which is the national phase under 35 U.S.C. §371 of prior PCT International Application No. PCT/AU97/00855 which has an International filing date of December 18, 1997, which designated the United States of America, and which was published by the International Bureau in English on July 2, 1998.--

The paragraph at page 2, line 21, has been amended as follows:

[Disclosure] Summary of the Invention

The paragraph at page 2, line 29, has been amended as follows:

According to one aspect, the present invention provides a method of removing fouling materials from the surface of a plurality of porous membranes arranged in a membrane module **[by providing, from within the module, by means other than gas passing through the pores of said membranes], the porous membranes forming an array, the module having a header wherein said membranes are mounted, the header connected to a source of pressurized gas, the method comprising providing, through the header,** gas bubbles in a uniform distribution relative to the porous membrane array such that said bubbles move past the surfaces of said membranes to dislodge fouling materials therefrom, said membranes being arranged in close proximity to one another and mounted to prevent excessive movement therebetween. The porous membranes may comprise hollow fibre membranes. Preferably, the fibre membranes are

Appl. No. : Unknown
Filed : Herewith

arranged in bundles surrounded by a perforated cage which serves to prevent said excessive movement therebetween.

The paragraph at page 3, line 8, has been amended as follows:

According to a second aspect, the present invention provides a membrane module comprising a plurality of porous membranes, said membranes being arranged in close proximity to one another and mounted to prevent excessive movement therebetween, **[and means for providing, from within the module, by means other than -gas passing through the pores of said membranes]** the membranes forming an array, the module having a header wherein said membranes are mounted, the header connected to a source of pressurized gas so as to permit formation of, gas bubbles such that, in use, said gas moves through said header, and said bubbles move past the surfaces of said membranes to dislodge fouling materials therefrom.

The paragraph at page 3, line 15, has been amended as follows:

The gas bubbles may be provided from within the module by a variety of methods including gas distribution holes or openings in the **[pot used to mount the membranes]** header, a porous tube located within the module or a tube or tubes positioned to output gas within the module, the tubes may be in the form of a comb of tubes Another method of providing gas bubbles includes creating gas in-situ by means of spark type ozone generators or the like. Further types of gas provision are detailed below and in the preferred embodiments of the invention.

The paragraph at page 3, line 23, has been amended as follows:

According to one preferred form, the present invention provides a method of removing fouling materials from the surface of a plurality of porous hollow fibre membranes mounted and extending longitudinally in an array to form a membrane module, said membranes being arranged in close proximity to one another and mounted to prevent excessive movement therebetween, the method comprising the steps of providing, from within said array, **[by means other than gas passing through the pores of said membranes,]** via the header connected to a

Appl. No. : Unknown
Filed : Herewith

source of pressurized gas, uniformly distributed gas bubbles, said distribution being such that said bubbles pass substantially uniformly between each membrane in said array to scour the surface of said membranes and remove accumulated solids from within the membrane module.

The paragraph at page 4, line 27, has been amended as follows:

According to a preferred further aspect, the present invention provides a filtration system including a membrane module according to said second aspect wherein said filter module is positioned vertically in a tank containing feed liquid to be filtered, means to apply a transmembrane pressure to said fibres in said array to cause filtrate to pass through pores in said fibres and means to supply continually or intermittently a supply of pressurized gas to said aeration holes so as to produce gas bubbles which move upwardly and uniformly between said fibres to scour the outer surfaces thereof.

The paragraph at page 6, line 27, has been amended as follows:

[Modes for Carrying Out the Invention] Detailed Description of the Preferred Embodiment

The following paragraphs have been inserted at page 6, after line 25:

--Figures 15a-c show a comb of tubes containing holes, the tube sitting within a module and providing pressurized gas bubbles. Figure 15a is a front view of the comb of tubes. Figure 15b is a top section view of the comb of tubes along Section A-A. Figure 15c is a top isometric view of the comb of tubes.

Figure 16 shows a module incorporating a porous sheet through which pressurized gas is supplied to provide gas bubbles.--